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(54) **runnerless nozzle for edge gates and injection molding apparatus comprising the same**

Angusslose Düse für Seitenanschnitte und Spritzgussmaschine die eine solche beinhaltet

Buse sans carotte à l'entrée latérale at appareil de moulage par injection contenir laquelle

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an injection molding apparatus, and more particularly, to an edge-gated injection molding apparatus.

Related Art

[0002] In many cases, edge-gated nozzles allow for improved mold cavity location over straight-gated nozzles. Improved cavity location can mean more economical molding operations.

[0003] However, edge gating can have problems not normally encountered in straight gating. For example, there are many solutions that simplify nozzle tip replacement in straight gating, and many of these do not require disassembly of the mold. The same cannot be said for edge gating. In addition, individual straight-gated cavities can be taken out of service relatively easily compared to the edge-gated scenario. A multiple injection molding system for edge gating is shown in US 2005/067510 A1, having a plurality of nozzle tips arranged laterally to a central nozzle body and projecting outwards over the circumferential surface of the nozzle body, wherein a sealing ring is provided around the downstream end of the nozzle tip, sealing the nozzle tip melt channel between the nozzle body and the mold plate. CA 2 110 438 C describes a multi-cavity injection molding apparatus with hot-tipped gates extending perpendicular to the direction of the mold opening.

[0004] Therefore, edge gating requires general improvement to realize some of the inherent benefits of straight gating.

SUMMARY OF THE INVENTION

[0005] A runnerless nozzle in accordance with the subject matter as defined in claim 1 is provided. The invention further provides an injection molding apparatus in accordance with claim 14. Further embodiments of the invention are defined in the dependent claims.

BRIEF DESCRIPTION OF THE FIGURES

[0006] Embodiments of the present invention will now be described more fully with reference to the accompanying drawings where like reference numbers indicate similar structure.

[0007] FIG. 1 is a partial cross-sectional view of an edge-gated injection molding apparatus in accordance with an embodiment of the present invention.

[0008] FIG. 2 is a close-up cross-sectional view of the downstream nozzle portion of FIG. 1.

[0009] FIG. 3 is a cross-sectional view of components

of the downstream nozzle portion of FIG. 2 being separated from the injection molding apparatus.

[0010] FIG. 4 is a perspective view of the securing component of FIG. 2.

5 **[0011]** FIG. 5 is a cross-sectional view of a blind tip used in the downstream nozzle portion of FIG. 2.

[0012] FIG. 6 is a cross-sectional view of a blind insert used in the downstream nozzle portion of FIG. 2.

10 **[0013]** FIG. 7 is a cross-sectional view of another embodiment of a downstream nozzle portion according to the present invention.

[0014] FIG. 8 is a cross-sectional view of another embodiment of a downstream nozzle portion according to the present invention.

15 **[0015]** FIG. 9 is a cross-sectional view of another embodiment of a nozzle tip according to the present invention.

20 **[0016]** FIG. 10 is a cross-sectional view of another embodiment of a nozzle tip according to the present invention.

[0017] FIG. 11 is a cross-sectional view of another embodiment of a downstream nozzle portion according to the present invention.

25 **[0018]** FIGS. 12A-12C are schematic diagrams of various heater configurations for nozzles of the embodiments described herein.

DETAILED DESCRIPTION OF THE INVENTION

30 **[0019]** An edge-gated injection molding apparatus in accordance with an embodiment of the present invention is illustrated in FIG. 1 and is generally indicated by reference numeral 10. The features and aspects described for the other embodiments can be used accordingly with the present embodiment.

35 **[0020]** Runnerless nozzles are nozzles where waste in the form of a hardened runner does not occur. In the present application, one form of a runnerless nozzle, a hot-runner nozzle, is described. However, the invention equally applies to other kinds of runnerless nozzles, such as those used for thermosets (e.g., liquid silicone rubber - LSR), where waste in the form of a hardened runner does not occur.

40 **[0021]** The injection molding apparatus 10 includes a manifold 12 that is located between a mold plate 22, a sprue bushing 24, and a back plate 26. A pressure disk 28 spaces the manifold 12 from the back plate 26 and allows for thermal expansion. The pressure disk 28 also maintains an insulating air space 27 between the manifold 12 and the back plate 26. A machine nozzle (not shown) delivers a stream of molding material under pressure to a manifold channel 14 of the manifold 12 through sprue bushing 24.

45 **[0022]** One or more runnerless nozzles 16 (one shown) are coupled to the manifold 12. Each nozzle 16 includes a nozzle body having an upstream nozzle portion 23 defining an upstream channel 18 that is aligned with a respective manifold outlet 20 to receive molding material

from the manifold channel 14. The nozzle 16 has a flange portion 19 that sits in a corresponding shoulder portion 21 of the mold plate 22.

[0023] The upstream nozzle portion 23 of the nozzle 16 extends through an opening 38, which extends through the mold plate 22 and a mold plate 40. A nozzle heater 32 is coupled about the upstream nozzle portion 23 to provide heat thereto. The nozzle heater 32 is in communication with a power source (not shown) through an electrical connector 34 (terminal end). A thermocouple 36 is coupled to the nozzle 16 to provide temperature measurements thereof.

[0024] A downstream nozzle portion 200 is connected to the downstream end of the upstream nozzle portion 23. The downstream nozzle portion 200 delivers molding material from the upstream nozzle portion 23 to a mold cavity or cavities 55.

[0025] The mold cavities 55 are radially spaced around the downstream nozzle portion 200. Gates to the mold cavities are defined by gate inserts 51 that are retained by a gate insert retainer 53. A cavity plate 58 is provided downstream of the downstream nozzle portion 200. Another plate 56 is provided to support the other components. The configuration of mold cavities 55, gate inserts 51, gate insert retainers 53, and plates 56, 58 can vary widely from design to design.

[0026] One or more of the plates 26, 22, 40 can be considered an example of a plate assembly. In other embodiments more or few plates can be used. The injection molding apparatus 10 is generally used as part of a mold. Opening the mold can include withdrawing the mold cores from the mold cavities 55 to allow ejection of the parts formed in the mold cavities 55. Other molds may have other opening operations, which may involve withdrawing plates.

[0027] FIG. 2 illustrates a close-up view of the downstream nozzle portion 200.

[0028] The downstream nozzle portion 200 includes a bracing portion defined by a bracing component 202, a plurality of nozzle tips 204 extending laterally through a plurality of bores 206 of the bracing component 202, and a securing component 208 inserted into the bracing component 202 to hold the nozzle tips 204 against the bracing component 202. At least one of the bracing component 202 and the securing component 208 defines a plurality of lateral channels 210 in communication with the upstream channel 18 (FIG. 1) for delivering molding material to the nozzle tips 204. In this embodiment, the securing component 208 includes the lateral channels 210.

[0029] Any number of nozzle tips 204 can be used, and the specific quantity may depend on the application at hand and the space available. In this embodiment the nozzle tips 204 are evenly radially spaced, but again, this is a design choice. Furthermore, since this is edge gating, the laterally extending nozzle tips 204 and the lateral channels 210 extend outwards from the upstream channel 18. While this lateral extension is shown as perpendicular, the nozzle tips 204 and channels 210 can be

disposed at angles other than perpendicular. The term "lateral" herein denotes that the flow of molding material has a lateral component with respect to the upstream channel 18, but need not be entirely lateral.

[0030] The bracing component 202 and securing component 208 work in conjunction to hold the nozzle tips 204 in place. The securing component 208 has a plug-like shape and is inserted into the bracing component 202, which has a mating cup-like shape. The securing component 208 is connected to the bracing component 202 by a fastener, such as bolts 212 (one shown). Besides bolts, any other kind of fastener can be used to fix the securing component 208 to the bracing component 202. A locator 213 locates the securing component 208, and thus the whole downstream nozzle portion 200, with respect to the plate 58. The locator 213 can also act as a point of support for downstream nozzle portion 200.

[0031] In this embodiment, the securing component 208 is slidably connected to the upstream nozzle portion 23 by way of a nozzle link 214 that threads into the upstream nozzle portion 23 and telescopically slides within an inlet opening 216 of the securing component 208. In another embodiment, the nozzle link 214 can be flipped around such that it is threaded into the securing component 208 and slidably mated with the upstream nozzle portion 23.

[0032] The bracing component 202 and the securing component 208 both have heaters 218 and 220, respectively. The heaters 218, 220 are embedded insulated conductive wires. However, other kinds of heaters may be used as well. In another embodiment, only one of the bracing component and the securing component has a heater. The heaters 218, 220 can be connected to each other or can be separate, as discussed below with respect to FIGS. 12a-c. In another embodiment, the nozzle 16 and manifold 12 are unheated.

[0033] Each nozzle tip 204 has a sealing component 222 for mating with a sealing surface 224 of a gate component, such as the gate insert 51, that defines the mold gate 226. In this embodiment, the sealing component includes a circumferential sealing surface 228 for mating with the surface 224 defined by a bore in the gate insert 51. In this way, the nozzle tip 204 engages with the gate insert 51 (gate component). Further, in this embodiment, the sealing component 222 and the nozzle tip 204 are separate pieces. In other embodiments, the gate component can be a plate or other structure that defines a mold gate.

[0034] To hold the nozzle tips 204 in place, a surface 230 of the securing component 208 contacts an upstream surface 232 of each nozzle tip 204 to engage a downstream shoulder 234 of the nozzle tip 204 with a shoulder 236 of the bracing component 202, via, in this embodiment, the sealing component 222. That is, the shoulder 234 of the nozzle tip 204 contacts the sealing component 222 and presses a shoulder 238 of the sealing component 222 against the shoulder 236 of the bracing component 202. In other embodiments having other sealing

component designs, the shoulder 234 of the nozzle tip 204 can directly press against the shoulder 236 of the bracing component 202.

[0035] Regarding geometry, the shoulder 234 of the nozzle tip 204, the shoulder 236 of the bracing component 202, and the shoulder 238 of the sealing component 222 are stepped shoulders. In another embodiment, the shoulders can be angled or tapered (e.g., conical). In addition, the surface 230 of the securing component 208 is an angled surface that contacts the likewise angled upstream surface 232 of the nozzle tip 204. In this embodiment, the surfaces 230, 232 are flat surfaces. In another embodiment, the surfaces 230, 232 can be tapered surfaces (e.g., conical).

[0036] Sealing against leakage of molding material is aided by the angle of the surfaces 230, 232 with respect to the direction of the fastening force provided by the bolts 212. That is, a wedging type action at the surfaces 230, 232 is translated into a thrusting type action at the shoulders 234, 236, 238, with both such actions aiding sealing. Accordingly, tightening the bolts 212 increases sealing force.

[0037] FIG. 3 shows components of the downstream nozzle portion 200 being separated from the injection molding apparatus 10.

[0038] The plate 58 (not shown) is removed, exposing and allowing access to the downstream nozzle body 200. Then, the securing component 208 is disconnected and removed from the bracing component 202, leaving an internal space 302. At the same time, the securing component 208 is withdrawn from the nozzle link 214. One or more nozzle tips 204 can then be withdrawn by first pulling them rearwardly into the space 302, and then out of the bracing component 202. As a nozzle tip 204 is removed it is slid away from the gate insert 51, such that the sealing surface 228 of the sealing component 222 disengages from the mating cylindrical sealing surface 224 defined by the gate insert 51. Alternatively, the sealing component 222 can be left engaged with the gate insert 51 if desired. Assembly of the downstream nozzle portion 200 is the same process reversed. Because of the way the securing component 208 and the bracing component 202 hold the nozzle tips 204, adding, removing, or replacing a nozzle tip 204 can be done with a reduced requirement for disassembly of the larger apparatus. The injection molding apparatus 10 does not have to be removed from the press to change a tip. In this embodiment, only partial disassembly of the mold is required, namely, the removal of the plate 58.

[0039] FIG. 4 shows the securing component 208 in perspective. The angled flat surfaces 230 are disposed between surfaces 402, which themselves may be flat or curved and vertical or sloped. Bolt holes 404 are arranged along the perimeter for receiving the bolts 212 (FIG. 2) for connection to the bracing component 202. Alternative locations for bolt holes are illustrated with phantom lines, and further locations would also be suitable.

[0040] FIG. 5 illustrates a blind tip 502 used in the

downstream nozzle portion 200. The blind tip 502 replaces a nozzle tip 204 that is to be taken out of service for some reason (e.g., mold cavity leakage or damage, etc). The blind tip 502 includes a surface 504 for contacting the surface 230 of the securing component 208, a shoulder 506 for contacting the shoulder 236 of the bracing component 202, and a surface 508 for engaging with the surface 224 of the gate insert 51. The blind tip 502 behaves in much the same way as a nozzle tip 204, except that the blind tip 502 blocks the flow of molding material to the associated mold gate 226 and cavity.

[0041] FIG. 6 illustrates a blind insert 602 used in the downstream nozzle portion 200. The blind insert 602 is disposed in a lateral channel 210 that is to be taken out of service for some reason (e.g., mold cavity leakage or damage, etc). The blind insert 602 can be inserted into the securing component 208 when the securing component 208 is removed from the bracing component 202. The blind insert 602 blocks the flow of molding material to the associated mold gate 226. In this embodiment, the blind insert 602 is used in conjunction with the blind tip 502. In other embodiments, the blind insert 602 can be used with a nozzle tip 204 provided that the blind insert 602 is held in place against pressure of the molding material. There are many structures well within the skill of a designer that can achieve this.

[0042] The blind tip 502 and the blind insert 602 can be referred to generically as flow blockers. Other kinds of flow blockers can be used as well.

[0043] FIG. 7 illustrates another embodiment of a downstream nozzle portion 700 according to the present invention. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0044] In this embodiment, the downstream nozzle portion 700 defines the nozzle body of the runnerless nozzle. In another embodiment, the downstream nozzle portion is connected to an upstream nozzle portion (as in FIG. 1) via a nozzle link (not shown).

[0045] The downstream nozzle portion 700 includes a neck portion 760 and a bracing portion 702 that are fixed together (welded, brazed, threaded, etc) or made from a single piece of material. The securing component 208 is connected to the bracing portion 702 as in the other embodiments. A pressure disk 762 can be provided on the downstream side of the securing component 208.

[0046] As mentioned, the neck portion 760 can define the entire nozzle body or simply a portion of a larger nozzle body.

[0047] FIG. 8 illustrates another embodiment of a downstream nozzle portion 800 according to the present invention. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0048] A downstream nozzle portion 800 has a securing component 808 that has a surface 830 contacting an

upstream surface 832 of a nozzle tip 804 to hold the nozzle tip 804 in place. The surfaces 830, 832 are flat or cylindrical in shape. Sealing against leakage of molding material can be aided by differences in thermal expansion of the materials selected for the securing component 808, bracing component 202, and nozzle tips 804. For example, the securing component 808 can be made of highly thermally expansive material which expands as the downstream nozzle portion 800 is heated to thrust the nozzle tips 804 against the bracing component 202. Other material combinations would be apparent to a designer.

[0049] FIG. 9 illustrates another embodiment of a nozzle tip according to the present invention. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0050] A downstream nozzle portion 900 includes a nozzle tip 904 having an integral sealing component 922.

[0051] FIG. 10 illustrates another embodiment of a nozzle tip according to the present invention. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0052] A downstream nozzle portion 1000 includes a nozzle tip 1004 having a sealing surface 1028 for engaging with the cylindrical sealing surface 224 of the gate insert 51. As in FIG. 9, the nozzle tip 1004 has an integral sealing component for engaging with a gate component (i.e., gate insert 51).

[0053] The surface 230 of the securing component 208 contacts an upstream surface 1032 of the nozzle tip 1004 to press a downstream shoulder 1034 of the nozzle tip 1004 against a spring 1070 seated on a shoulder 236 of the bracing component 202. The spring 1070 can be a coil spring, one or more Belleville washers, or similar device.

[0054] FIG. 11 illustrates another embodiment of a downstream nozzle portion according to the present invention. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0055] A downstream nozzle portion 1100 includes a bracing portion 1102 and a neck portion 1160 fixed together or made of the same piece. The bracing portion 1102 defines lateral channels 1110 in communication with the upstream channel 18 for delivering molding material to nozzle tips 1104.

[0056] Each nozzle tip 1104 extends through a bore 1106 of the bracing portion 1102 and defines a tip channel 1180 that communicates with the lateral channel 1110. A securing component 1108 is inserted into the bracing portion 1102 and is fastened to the bracing portion 1102 to hold the nozzle tip 1104 in place via surfaces 1130, 1132.

[0057] As in the embodiment of FIG. 7, the neck portion 1160 can define the entire nozzle body or simply a portion of a larger nozzle body.

[0058] FIGS. 12A-12C show various heater configurations for nozzles of the embodiments described herein. In the other figures, the heater wire connections were omitted for clarity. The features and aspects described for the other embodiments can be used accordingly with the present embodiment. Only differing features and aspects of the present embodiment are described in detail.

[0059] In FIG. 12A, a runnerless nozzle includes a nozzle head 1202, a first terminal end 1204 extending from the nozzle head 1202, an upstream nozzle portion 1206, and a first heater wire 1208 embedded in the upstream nozzle portion 1206. First leads 1210 extend from the first terminal end 1204 to a power supply (not shown) to provide electrical power to the first heater wire 1208.

[0060] A bracing component 1212 (see FIGS. 1-11) has a second heater wire 1214 embedded therein. A second terminal end 1216 extends from the bracing component 1212, with second leads 1218 extending back to a power supply.

[0061] A securing component 1220 (see FIGS. 1-11) has a third heater wire 1222 embedded therein. A quick-connect lead 1224 connects the third heater wire 1222 with the second heater wire 1214. Accordingly, the second and third heater wires 1214, 1222 are connected in series. In another embodiment, the quick-connect lead is replaced by a continuous lead.

[0062] The bracing component 1212 and securing component 1220 engage with each other to hold the nozzle tips (not shown) as described herein. One of the bracing component 1212 and the securing component 1220 is connected to the upstream nozzle portion 1206 via a nozzle link 1226.

[0063] In the embodiment of FIG. 12B, the securing component 1220 has a third terminal end 1228 for connecting the third heater wire 1222 to third leads 1230 that extend back to a power supply. Unlike the embodiments of FIGS. 12A and 12C, the second and third heater wires 1214, 1222 are not connected in series.

[0064] In the embodiment of FIG. 12C, the second heater wire 1214 of the bracing component 1212 is connected to the first heater wire 1208 of the upstream nozzle portion 1206 via a quick-connect lead 1232. In another embodiment, a quick-connect lead is replaced by a continuous lead. Unlike the embodiments of FIGS. 12A and 12B, the first and second heater wires 1208, 1214 are connected in series.

[0065] FIGS. 12A-12C show different ways that one, two, or three terminal ends can be used to connect the three heaters of the nozzle to one or more power supplies. These embodiments can be simplified if one or more of the heaters are omitted, as may be the case. FIGS. 12A-12C also apply to embodiments, such as those of FIGS. 7 and 11, where the bracing component and upstream nozzle portion are integral. In addition, while embedded resistance heater wires are shown by

way of example, other kinds of heaters can be used instead.

[0066] Although many embodiments of the present invention have been described, those of skill in the art will appreciate that other variations and modifications may be made as defined by the appended claims.

Claims

1. A runnerless nozzle (16), comprising:

a nozzle body (23) defining an upstream channel (18);
a downstream bracing portion (202) having a lateral bore (206);
a nozzle tip (204) extending laterally through the lateral bore (206) of the bracing portion (202), the nozzle tip (204) having a sealing surface (228) for engaging a gate component (51) that defines a mold gate (226); and
a securing component (208) separate from the nozzle body (23) and inserted into the bracing portion (202) to hold the nozzle tip (204) against the bracing portion (202);

wherein at least one of the bracing portion (202) and the securing component (208) defines a lateral channel (210) in communication with the upstream channel (18) for delivering molding material to the nozzle tip (204);

characterized in that the securing component (208) contacts an upstream surface (232) of the nozzle tip (204) to engage a downstream shoulder (234) of the nozzle tip (204) with a shoulder (236) of the bracing portion (202), wherein the upstream surface (232) of the nozzle tip (204) is angled and the securing component (208) has an angled surface (230) that contacts the angled upstream surface (232) of the nozzle tip (204).

2. The runnerless nozzle (16) of claim 1, wherein the angled upstream surface (232) of the nozzle tip (204) and the angled surface (230) of the securing component (208) are flat surfaces.

3. The runnerless nozzle (16) of claim 1, wherein the angled upstream surface (232) of the nozzle tip (204) and the angled surface (230) of the securing component (208) are tapered surfaces.

4. The runnerless nozzle (16) of claim 1, wherein the shoulder (234) of the nozzle tip (204) and the shoulder (236) of the bracing portion (202) are stepped shoulders.

5. The runnerless nozzle (16) of claim 1, wherein the securing component (208) contacts an upstream surface (232) of the nozzle tip (204) to press a down-

stream shoulder (234) of the nozzle tip (204) against a spring seated on a shoulder (236) of the bracing portion (202).

6. The runnerless nozzle (16) of claim 1, wherein bracing portion (202) is a separate component from the nozzle body (23), the runnerless nozzle (16) further comprising a nozzle link (214) slidably connecting the nozzle body (23) to the securing component (208).

7. The runnerless nozzle (16) of claim 1, wherein the securing component (208) is connected to the bracing portion (202) by a fastener.

8. The runnerless nozzle (16) of claim 1, wherein one or more nozzle tips (204) extend through a plurality of lateral bores (206) of the bracing portion (202), and a plurality of lateral channels (210) are in communication with the upstream channel (18) for delivering molding material to the one or more nozzle tips (204).

9. The runnerless nozzle (16) of claim 6, further comprising a flow blocker that blocks one of the lateral channels (210), wherein the flow blocker comprises a blind tip (502) extending through the bore (206) associated with the one of the lateral channels (210), and/or wherein the flow blocker comprises a blind insert (602) disposed in the one of the lateral channels (210).

10. The runnerless nozzle (16) of claim 1, wherein the sealing surface (228) is a circumferential sealing surface of the nozzle tip (204) for mating with a surface (224) of a bore in the gate component (51).

11. The runnerless nozzle (16) of claim 1, wherein the nozzle tip (204) has a separate sealing component (222) that defines the sealing surface (228).

12. The runnerless nozzle (16) of claim 1, wherein the bracing portion (202) is integral with the nozzle body (23).

13. The runnerless nozzle (16) of claim 1, wherein the bracing portion (202) is a separate component from the nozzle body (23) and the securing component (208) is slidably connected to the nozzle body (23).

14. An injection molding apparatus (10), comprising:

a plate assembly;
a sprue bushing (24);
a manifold (12) defining a manifold channel (14), the manifold (12) connected to the plate assembly and the sprue bushing (24); and

a nozzle (16) connected to the manifold (12), including:

a nozzle body (23) defining an upstream channel (18);

a downstream bracing portion (202) having a plurality of lateral bores (206);

a plurality of nozzle tips (204) extending laterally through the lateral bores (206) of the bracing portion (202), each nozzle tip (204) having a sealing surface (228) for engaging a gate component (51) that defines a mold gate (226); and a securing component (208) separate from the nozzle body (23) and connected to the bracing portion (202) to hold the nozzle tip (204) against the bracing portion (202);

wherein at least one of the bracing portion (202) and the securing component (208) defines lateral channels (210) in communication with the upstream channel (18) for delivering molding material to the nozzle tips (204)

characterized in that the securing component (208) contacts an upstream surface (232) of each nozzle tip (204) to engage a downstream shoulder (234) of the nozzle tips (204) with a shoulder (236) of the bracing portion (202), wherein the upstream surface (232) of the nozzle tips (204) is angled and the securing component (208) has an angled surface (230) that contacts the angled upstream surface (232) of the nozzle tips (204).

15. The injection molding apparatus (10) of claim 14, wherein the securing component (208) is connected to the nozzle body (23).

Patentansprüche

1. Eine Heißläuferdüse (16), umfassend:

einen Düsenkörper (23), der einen stromaufwärtigen Kanal (18) definiert;

einen stromabwärtigen Abzweigbereich (202) mit einer seitlichen Bohrung (206);

eine Düsenspitze (204), die sich seitlich durch die seitliche Bohrung (206) des Abzweigbereichs (202) erstreckt, die Düsenspitze (204) weist eine Dichtungsfläche (228) auf, um in ein Angussbauteil (51), das eine Formangussöffnung (226) ausbildet, einzugreifen; und

ein Sicherungsbauteil (208), das unabhängig von dem Düsenkörper (23) und, in den Abzweigbereich (202) eingesetzt ist, um die Düsenspitze (204) gegen den Abzweigbereich (202) zu halten;

wobei mindestens der Abzweigbereich (202) oder das Sicherungsbauteil (208) einen seitli-

chen Kanal (210) definiert, der in Verbindung mit dem stromaufwärtigen Kanal (18) steht, um Formmaterial an die Düsenspitze (204) zu fördern;

dadurch gekennzeichnet, dass das Sicherungsbauteil (208) eine stromaufwärtige Oberfläche (232) der Düsenspitze (204) berührt, um eine stromabwärtige Schulter (234) der Düsenspitze (204) mit einer Schulter (236) des Abzweigbereichs (202) in Eingriff zu bringen, wobei die stromaufwärtige Oberfläche (232) der Düsenspitze (204) geneigt ist und das Sicherungsbauteil (208) eine geneigte Oberfläche (230) aufweist, die die geneigte stromaufwärtige Oberfläche (232) der Düsenspitze (204) berührt.

2. Die Heißläuferdüse (16) nach Anspruch 1, wobei die geneigte stromaufwärtige Oberfläche (232) der Düsenspitze (204) und die geneigte Oberfläche (230) des Sicherungsbauteils (208) ebene Oberflächen sind.

3. Die Heißläuferdüse (16) nach Anspruch 1, wobei die geneigte stromaufwärtige Oberfläche (232) der Düsenspitze (204) und die geneigte Oberfläche (230) des Sicherungsbauteils (208) kegelförmige Oberflächen sind.

4. Die Heißläuferdüse (16) nach Anspruch 1, wobei die Schulter (234) der Düsenspitze (204) und die Schulter (236) des Abzweigbereichs (202) stufenförmige Schultern sind.

5. Die Heißläuferdüse (16) nach Anspruch 1, wobei das Sicherungsbauteil (208) eine stromaufwärtige Oberfläche (232) der Düsenspitze (204) berührt, um eine stromabwärtige Schulter (234) der Düsenspitze (204) gegen eine an einer Schulter (236) des Abzweigbereichs (202) sitzende Feder zu drücken.

6. Die Heißläuferdüse (16) nach Anspruch 1, wobei der Abzweigbereich (202) ein von dem Düsenkörper (23) separates Bauteil ist, die Heißläuferdüse (16) umfasst weiter eine Düsenverbindung (214), die den Düsenkörper (23) verschiebbar mit dem Sicherungsbauteil (208) verbindet.

7. Die Heißläuferdüse (16) nach Anspruch 1, wobei das Sicherungsbauteil (208) durch ein Befestigungsmittel mit dem Abzweigbereich (202) verbunden ist.

8. Die Heißläuferdüse (16) nach Anspruch 1, wobei eine oder mehrere Düsenspitzen (204) sich durch eine Vielzahl von seitlichen Bohrungen (206) des Abzweigbereichs (202) erstrecken und eine Vielzahl von seitlichen Kanälen (210) in Verbindung mit dem stromaufwärtigen Kanal (18) stehen, um Formmaterial an die eine oder mehrere Düsenspitzen (204) zu

fördern.

9. Die Heißläuferdüse (16) nach Anspruch 6, weiter umfassend eine Strömungssperre, die einen der seitlichen Kanäle (210) blockiert, wobei die Strömungssperre eine Blindspitze (502) umfasst, die sich durch die Bohrung (206) erstreckt, die einem der seitlichen Kanäle (210) zugeordnet ist, und/oder wobei die Strömungssperre einen Blindeinsatz (602) umfasst, der in einem der seitlichen Kanäle (210) angeordnet ist. 5
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10. Die Heißläuferdüse (16) nach Anspruch 1, wobei die Dichtungsoberfläche (228) eine umlaufende Dichtungsoberfläche der Düsenspitze (204) ist, um zu einer Oberfläche (224) einer Bohrung in dem Angussbauteil (51) zu passen. 15
11. Die Heißläuferdüse (16) nach Anspruch 1, wobei die Düsenspitze (204) ein separates Dichtungsbauteil (222) aufweist, die die Dichtungsoberfläche (228) definiert. 20
12. Die Heißläuferdüse (16) nach Anspruch 1, wobei der Abzweigbereich (202) integral mit dem Düsenkörper (23) ausgebildet ist. 25
13. Die Heißläuferdüse (16) nach Anspruch 1, wobei der Abzweigbereich (202) ein separates Bauteil zum Düsenkörper (23) ist und das Sicherungsbauteil (208) verschiebbar mit dem Düsenkörper (23) verbunden ist. 30
14. Eine Spritzgießvorrichtung (10), umfassend: 35
 - eine Plattenanordnung;
 - eine Einspritzbuchse (24);
 - einen Verteiler (12), der einen Verteilerkanal (14) definiert, der Verteiler (12) ist mit der Plattenanordnung und der Einspritzbuchse (24) verbunden; und 40

eine Düse (16), die mit dem Verteiler (12) verbunden ist, einschließend: 45

 - einen Düsenkörper (23), der einen stromaufwärtigen Kanal (18) definiert;
 - einen stromabwärtigen Abzweigbereich (202) mit einer Vielzahl von seitlichen Bohrungen (206); 50
 - eine Vielzahl von Düsenspitzen (204), die sich seitlich durch die seitliche Bohrung (206) des Abzweigbereichs (202) erstrecken, jede Düsenspitze (204) weist eine Dichtungsoberfläche (228) auf, um in ein Angussbauteil (150), das eine Formangussöffnung (226) ausbildet; einzugreifen und 55
 - ein Sicherungsbauteil (208), das unabhängig

von dem Düsenkörper (23) ist und mit dem Abzweigbereich (202) verbunden ist, um die Düsenspitze (204) gegen den Abzweigbereich (202) zu halten;

wobei mindestens der Abzweigbereich (202) oder das Sicherungsbauteil (208) seitliche Kanäle (210) definieren, die in Verbindung mit einem stromaufwärtigen Kanal (18) stehen, um Formmaterial an die Düsenspitzen (204) zu fördern;

dadurch gekennzeichnet, dass das Sicherungsbauteil (208) eine stromaufwärtige Oberfläche (232) jeder Düsenspitze (204) berührt, um eine stromabwärtige Schulter (234) der Düsenspitzen (204) mit einer Schulter (236) des Abzweigbereichs (202) in Eingriff zu bringen, wobei die stromaufwärtige Oberfläche (232) der Düsenspitzen (204) geneigt ist und das Sicherungsbauteil (208) eine geneigte Oberfläche (230) aufweist, die die geneigte stromaufwärtige Oberfläche (232) der Düsenspitzen (204) berührt.

15. Die Spritzgießvorrichtung (10) nach Anspruch 14, wobei das Sicherungsbauteil (208) mit dem Düsenkörper (23) verbunden ist.

Revendications

1. Buse sans carotte (16), comprenant :

- un corps de buse (23) définissant un canal amont (18) ;
- une partie d'appui aval (202) comportant un alésage latéral (206) ;
- une pointe de buse (204) s'étendant latéralement à travers l'alésage latéral (206) de la partie d'appui (202), la pointe de buse (204) comportant une surface d'étanchéité (228) venant au contact d'un élément de trou de coulée (51) qui définit un trou de coulée de moule (226) ; et
- un élément de fixation (208) séparé du corps de buse (23) et inséré dans la partie d'appui (202) pour maintenir la pointe de buse (204) contre la partie d'appui (202) ;
- dans laquelle au moins un élément parmi la partie d'appui (202) et l'élément de fixation (208) définit un canal latéral (210) en communication avec le canal amont (18) pour délivrer de la matière à mouler à la pointe de buse (204) ;
- **caractérisée en ce que** l'élément de fixation (208) vient au contact d'une surface amont (232) de la pointe de buse (204) pour faire venir un épaulement aval (234) de la pointe de buse (204) au contact d'un épaulement (236) de la partie d'appui (202), dans laquelle la surface amont (232) de la pointe de buse (204) forme un angle et l'élément de fixation (208) comporte

une surface formant un angle (230) qui vient au contact de la surface amont formant un angle (232) de la pointe de buse (204).

2. Buse sans carotte (16) selon la revendication 1, dans laquelle la surface amont formant un angle (232) de la pointe de buse (204) et la surface formant un angle (230) de l'élément de fixation (208) sont des surfaces planes. 5
3. Buse sans carotte (16) selon la revendication 1, dans laquelle la surface amont formant un angle (232) de la pointe de buse (204) et la surface formant un angle (230) de l'élément de fixation (208) sont des surfaces coniques. 10
4. Buse sans carotte (16) selon la revendication 1, dans laquelle l'épaule (234) de la pointe de buse (204) et l'épaule (236) de la partie d'appui (202) sont des épaulements à gradins. 15
5. Buse sans carotte (16) selon la revendication 1, dans laquelle l'élément de fixation (208) vient au contact d'une surface amont (232) de la pointe de buse (204) pour presser un épaulement aval (234) de la pointe de buse (204) contre un ressort disposé sur un épaulement (236) de la partie d'appui (202). 20
6. Buse sans carotte (16) selon la revendication 1, dans laquelle la partie d'appui (202) est un élément séparé du corps de buse (23), la buse sans carotte (16) comprenant en outre une bague de buse (214) reliant de façon coulissante le corps de buse (23) à l'élément de fixation (208). 25
7. Buse sans carotte (16) selon la revendication 1, dans laquelle l'élément de fixation (208) est connecté à la partie d'appui (202) par une attache. 30
8. Buse sans carotte (16) selon la revendication 1, dans laquelle une ou plusieurs pointes de buse (204) s'étendent à travers une pluralité d'alésages latéraux (206) de la partie d'appui (202) et une pluralité de canaux latéraux (210) sont en communication avec le canal amont (18) pour délivrer de la matière à mouler à l'une ou plusieurs pointes de buse (204). 35
9. Buse sans carotte (16) selon la revendication 6, comprenant en outre un bloqueur d'écoulement qui bloque un des canaux latéraux (210), dans laquelle le bloqueur d'écoulement comprend une pointe borgne (502) s'étendant à travers l'alésage (206) associé audit un des canaux latéraux (210) et/ou dans laquelle le bloqueur d'écoulement comprend un insert borgne (602) disposé dans ledit un des canaux latéraux (210). 40
10. Buse sans carotte (16) selon la revendication 1, dans 45

laquelle la surface d'étanchéité (228) est une surface d'étanchéité circonférentielle de la pointe de buse (204) destinée à s'accoupler avec une surface (224) d'un alésage dans l'élément de trou de coulée (51).

11. Buse sans carotte (16) selon la revendication 1, dans laquelle la pointe de buse (204) comporte un élément d'étanchéité séparé (222) qui définit la surface d'étanchéité (228). 50
12. Buse sans carotte (16) selon la revendication 1, dans laquelle la partie d'appui (202) fait partie intégrante du corps de buse (23). 55
13. Buse sans carotte (16) selon la revendication 1, dans laquelle la partie d'appui (202) est un élément séparé du corps de buse (23) et l'élément de fixation (208) est connecté de façon coulissante au corps de buse (23).
14. Appareil de moulage par injection (10), comprenant :
 - un ensemble de plaque ;
 - une buse de moule (24) ;
 - une tubulure (12) définissant un canal de tubulure (14), la tubulure (12) étant reliée à l'ensemble de plaque et à la buse de moule (24) ; et
 - une buse (16) reliée à la tubulure (12), incluant
 - un corps de buse (23) définissant un canal amont (18) ;
 - une partie d'appui aval (202) comportant une pluralité d'alésages latéraux (206) ;
 - une pluralité de pointes de buse (204) s'étendant latéralement à travers les alésages latéraux (206) de la partie d'appui (202), chaque pointe de buse (204) comportant une surface d'étanchéité (228) venant au contact d'un élément de trou de coulée (51) qui définit un trou de coulée de moule (226) ; et
 - un élément de fixation (208) séparé du corps de buse (23) et connecté à la partie d'appui (202) pour maintenir la pointe de buse (204) contre la partie d'appui (202) ;
 - dans lequel au moins un élément parmi la partie d'appui (202) et l'élément de fixation (208) définit des canaux latéraux (210) en communication avec le canal amont (18) pour délivrer de la matière à mouler aux pointes de buse (204) ;
 - **caractérisé en ce que** l'élément de fixation (208) vient au contact d'une surface amont (232) de chaque pointe de buse (204) pour faire venir un épaulement aval (234) des pointes de buse (204) au contact d'un épaulement (236) de la partie d'appui (202), dans lequel la surface amont (232) des pointes de buse (204) forme un angle et l'élément de fixation (208) comporte une surface formant un angle (230) qui vient au

contact de la surface amont formant un angle
(232) des pointes de buse (204).

15. Appareil de moulage par injection (10) selon la revendication 14, dans lequel l'élément de fixation (208) est connecté au corps de buse (23).

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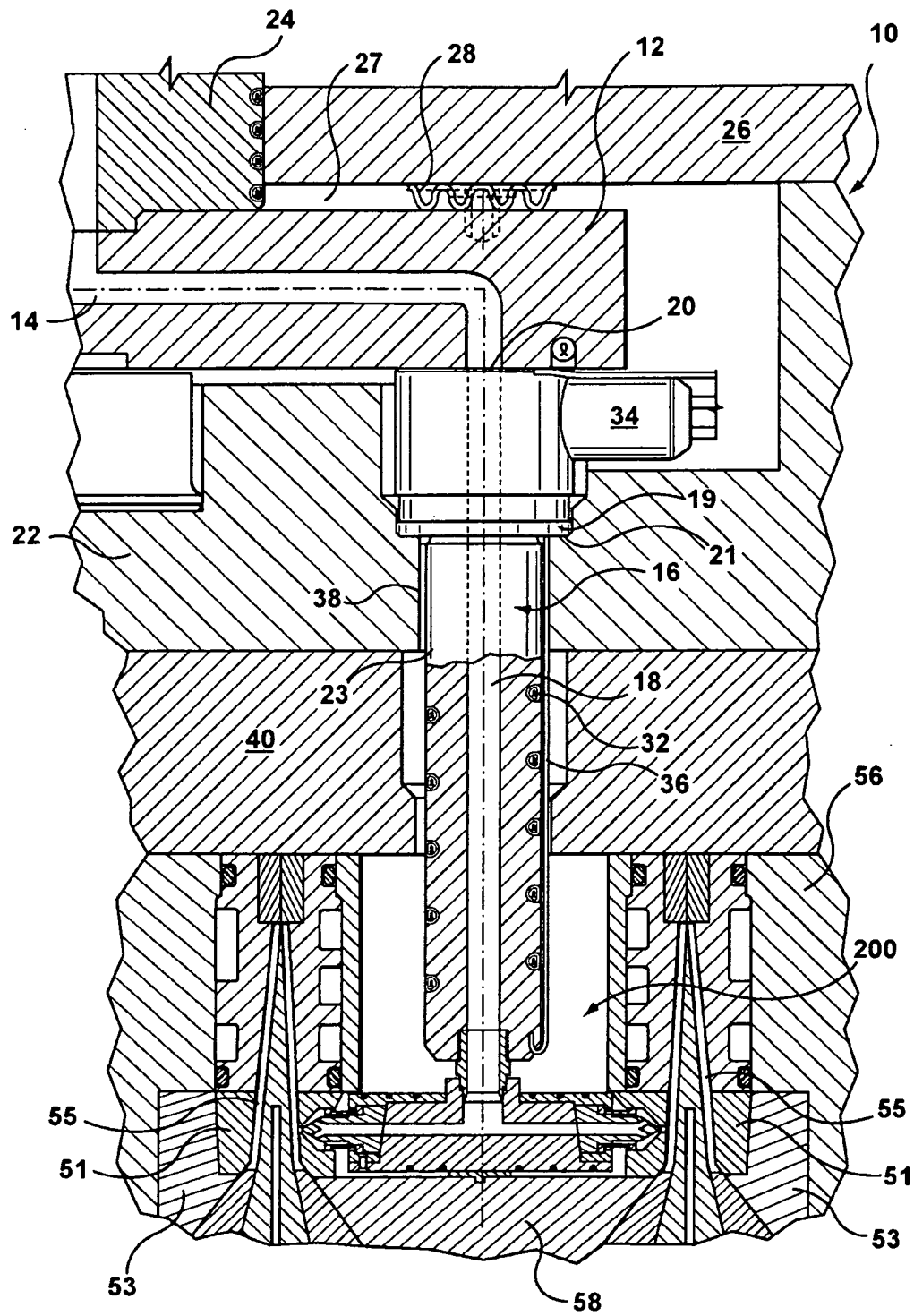


FIG. 1

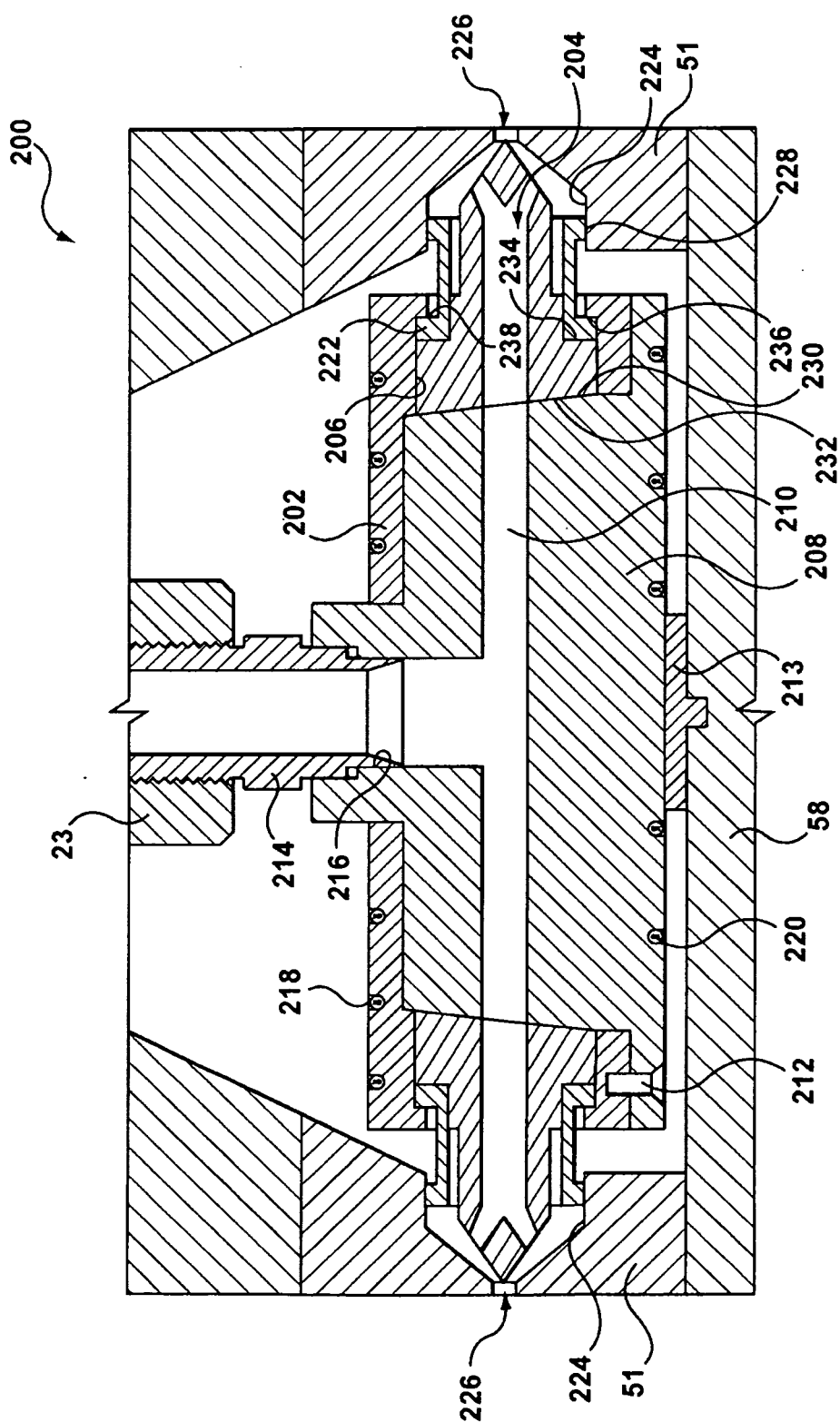


FIG. 2

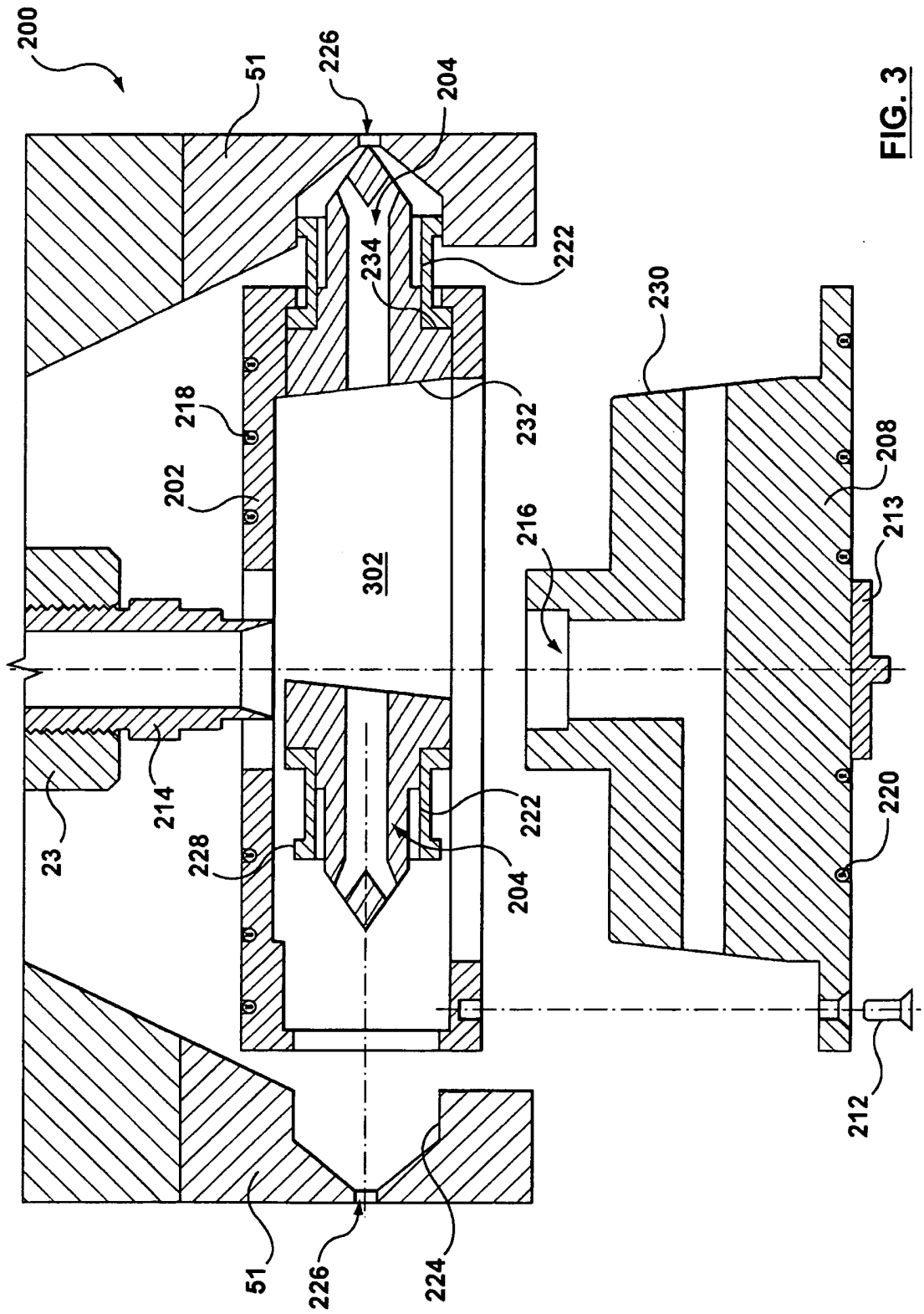


FIG. 3

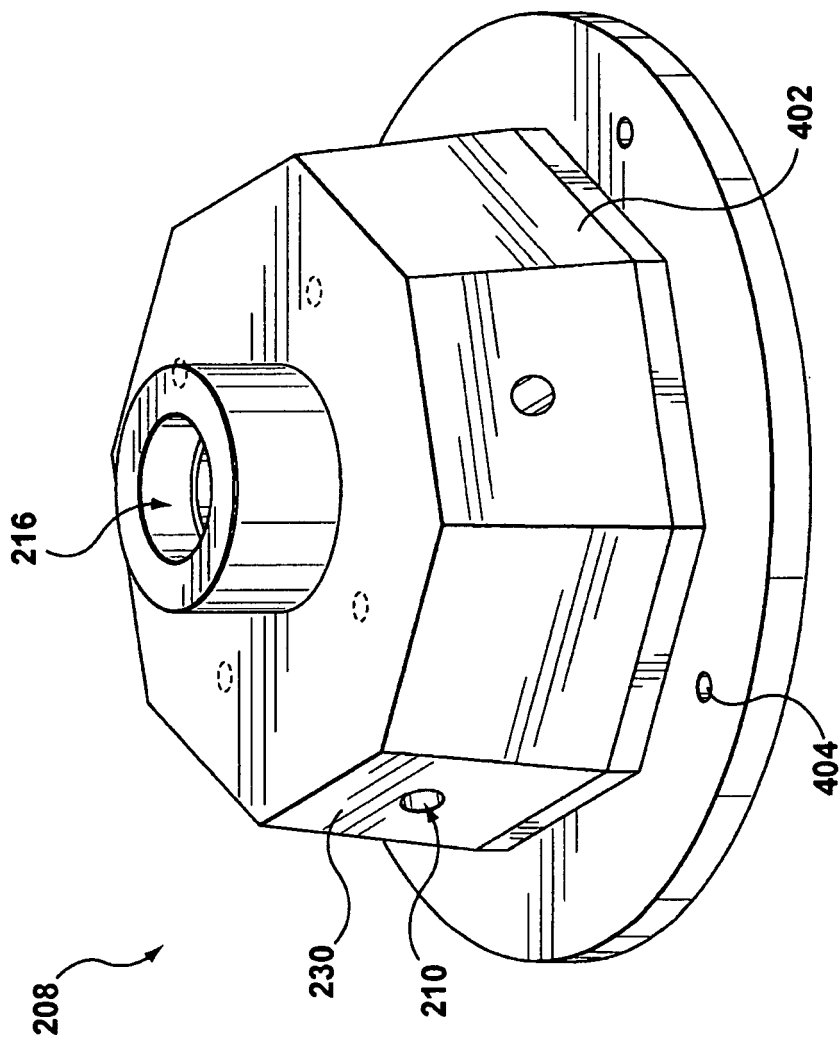


FIG. 4

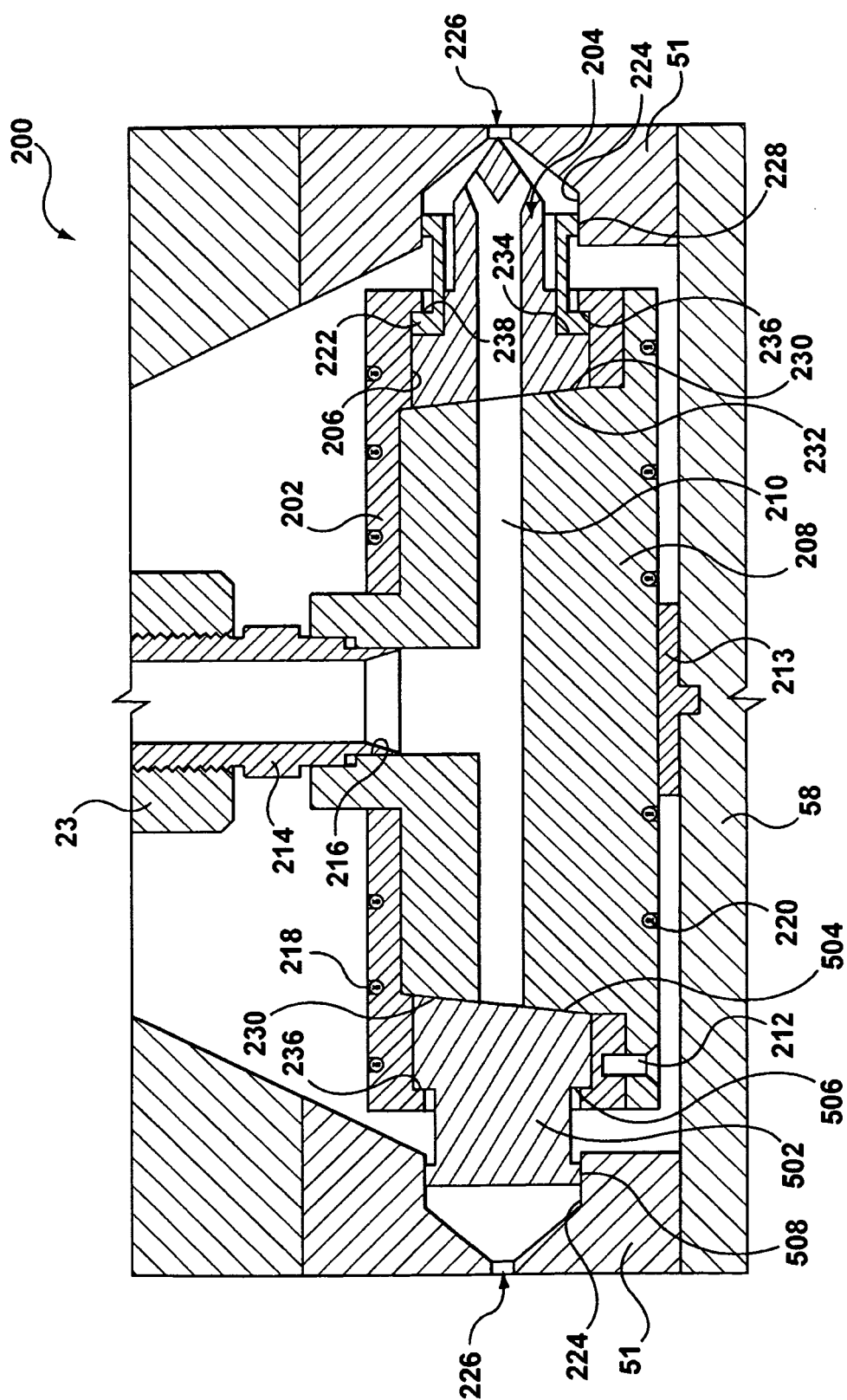


FIG. 5

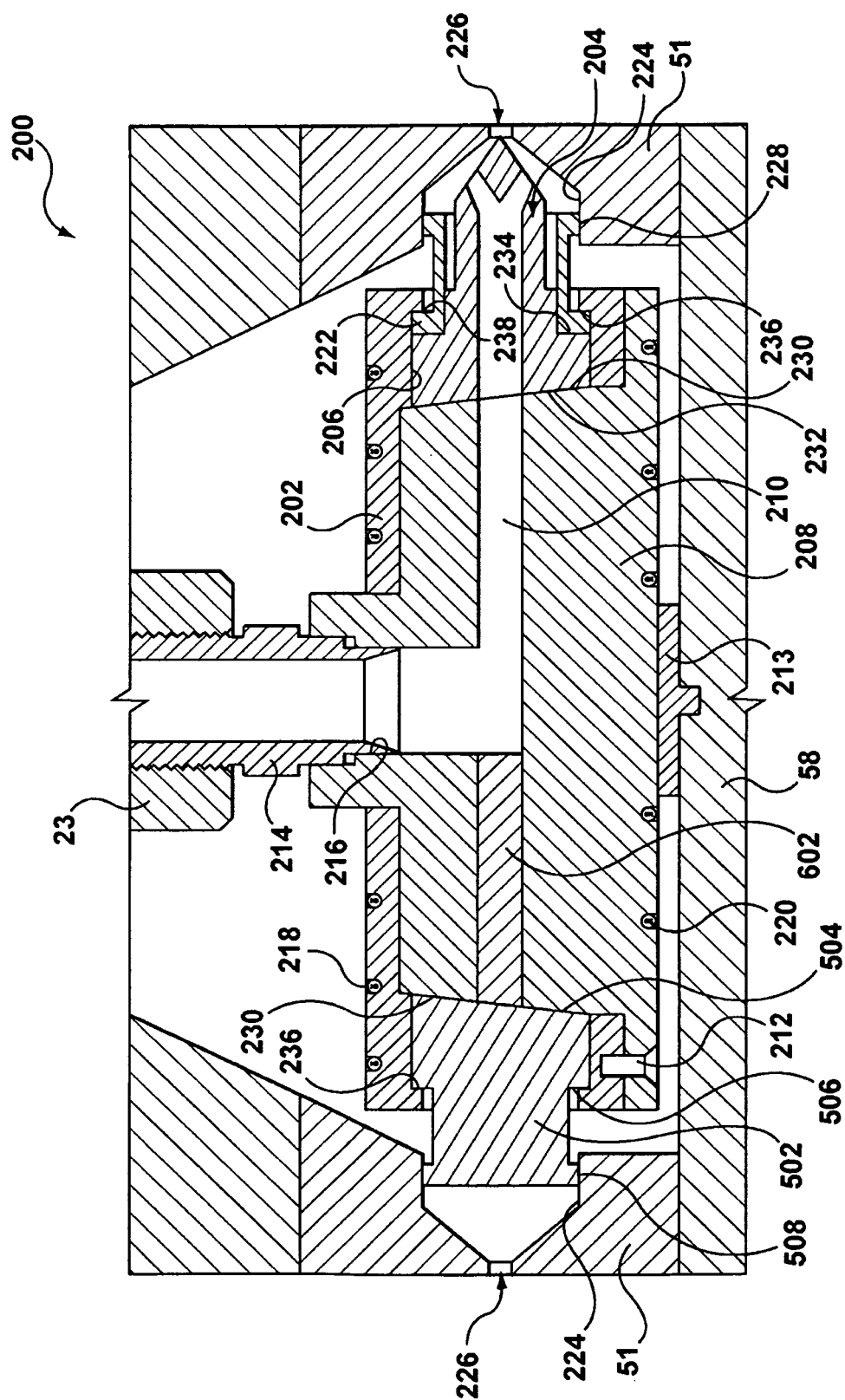


FIG. 6

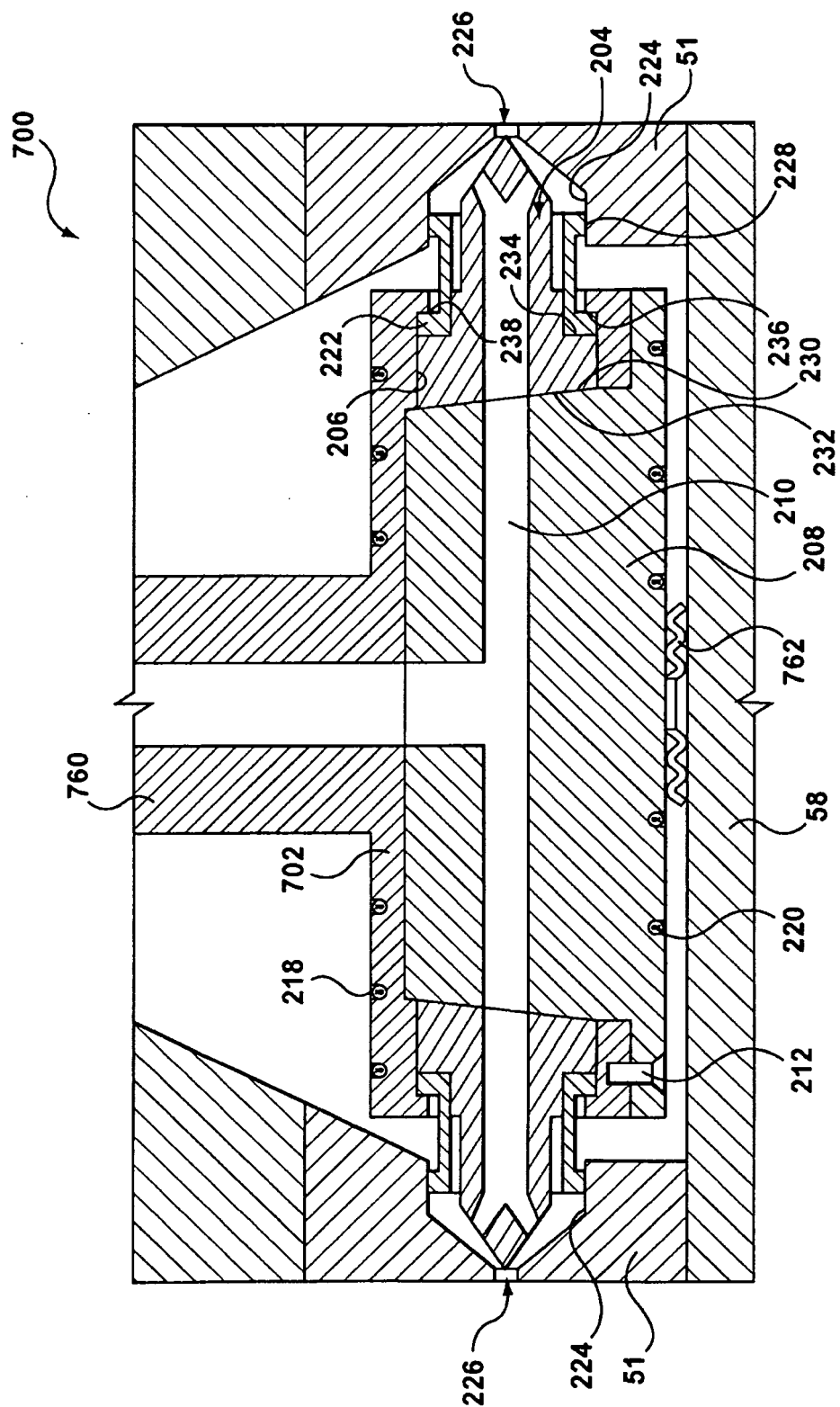


FIG. 7

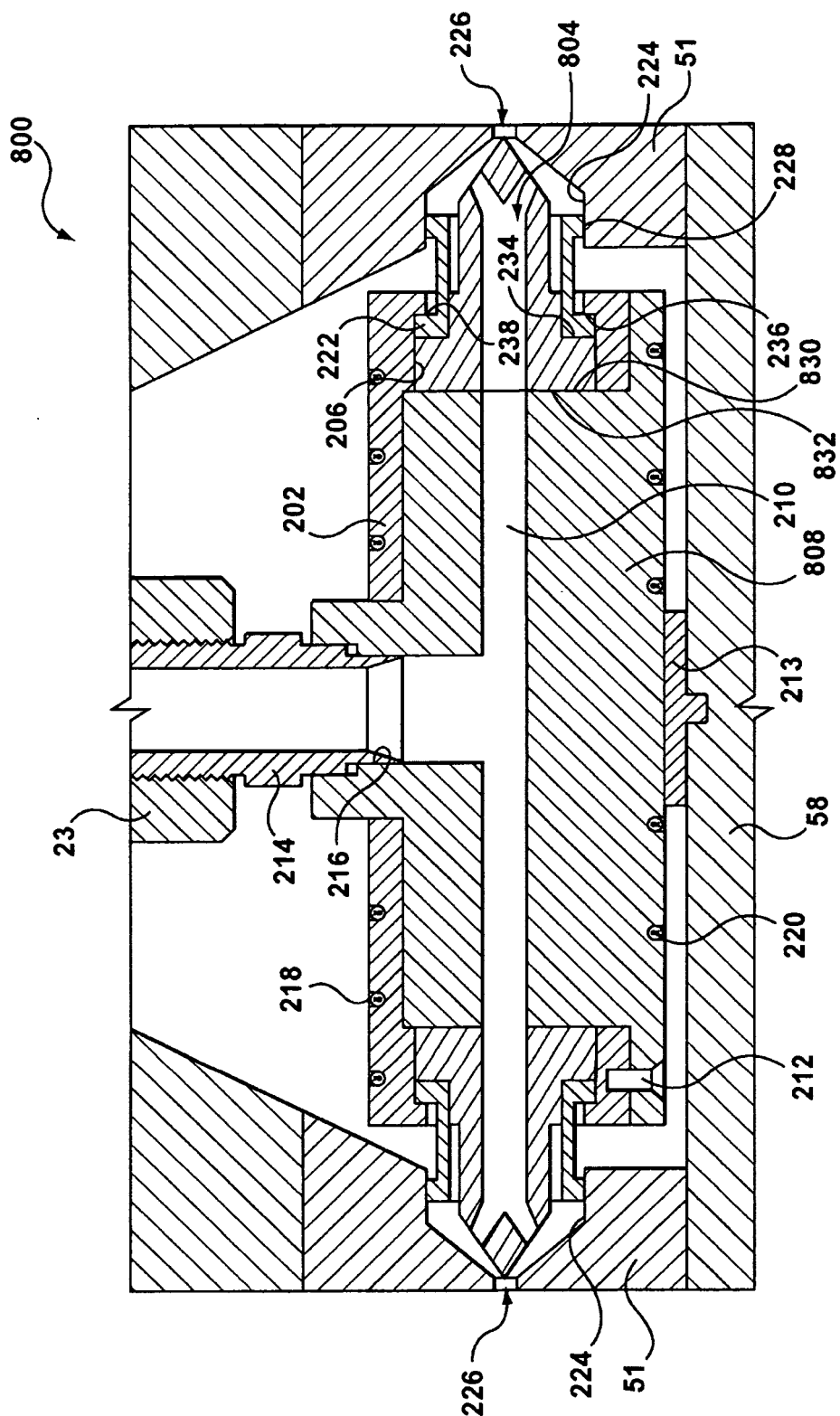


FIG. 8

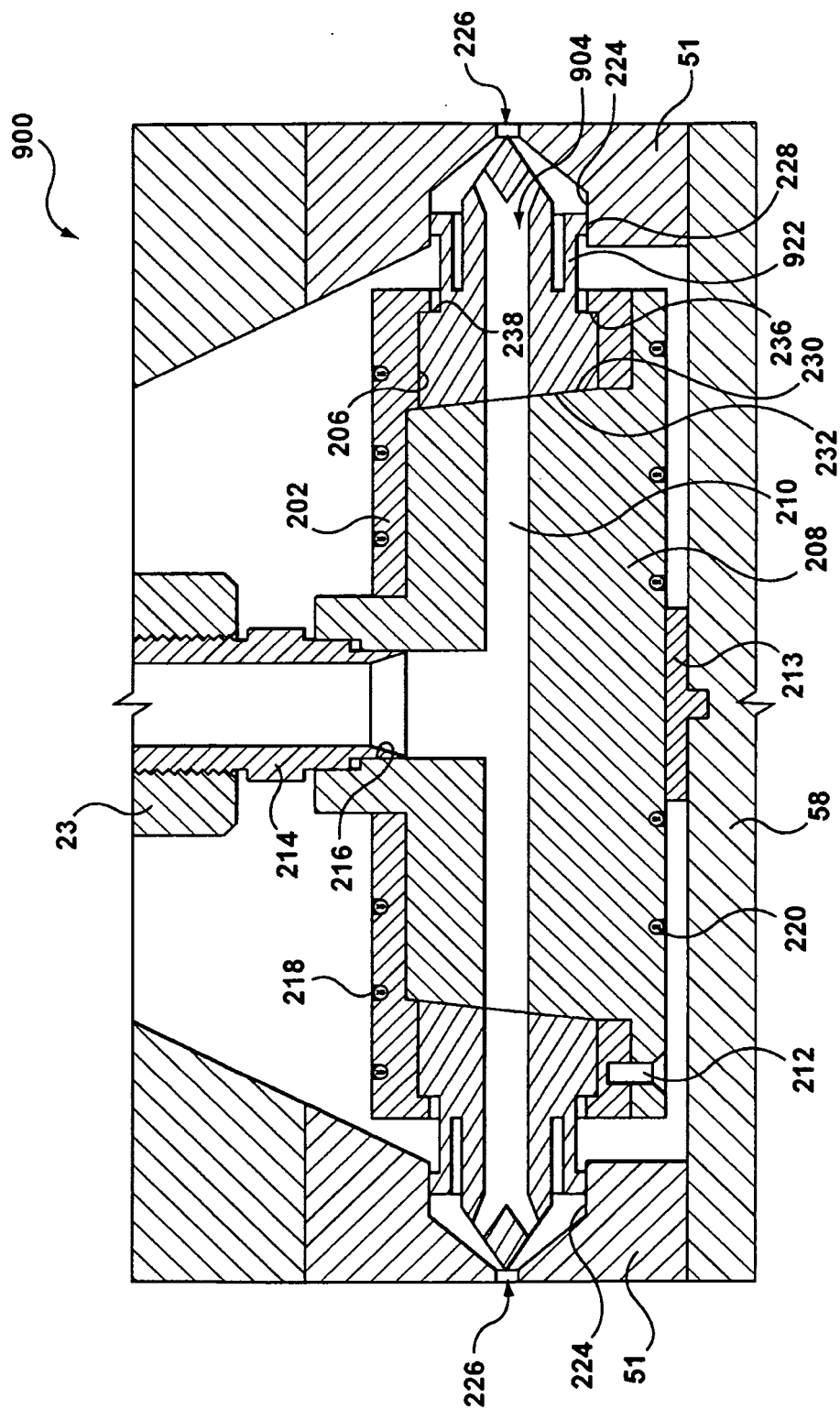


FIG. 9

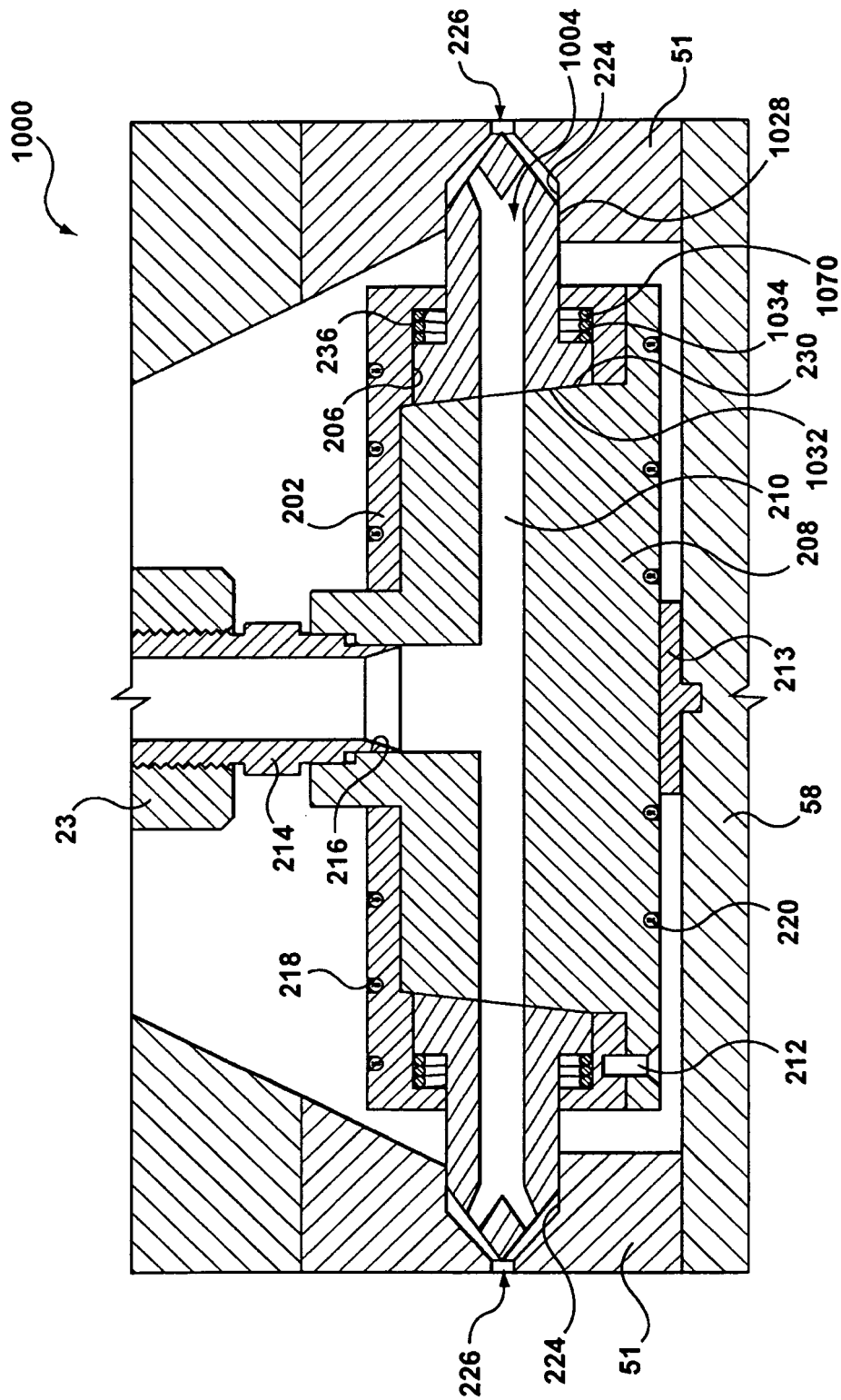


FIG. 10

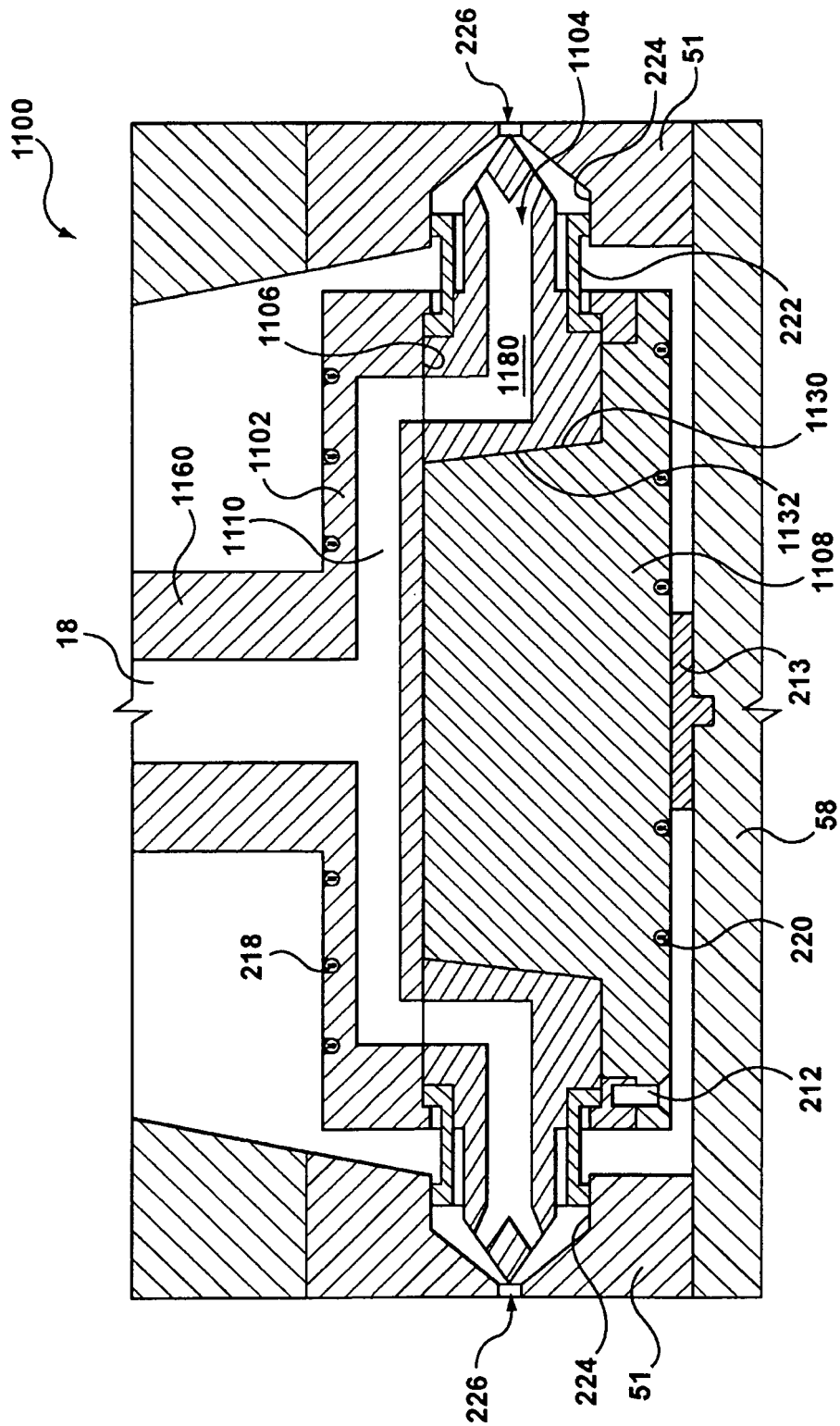
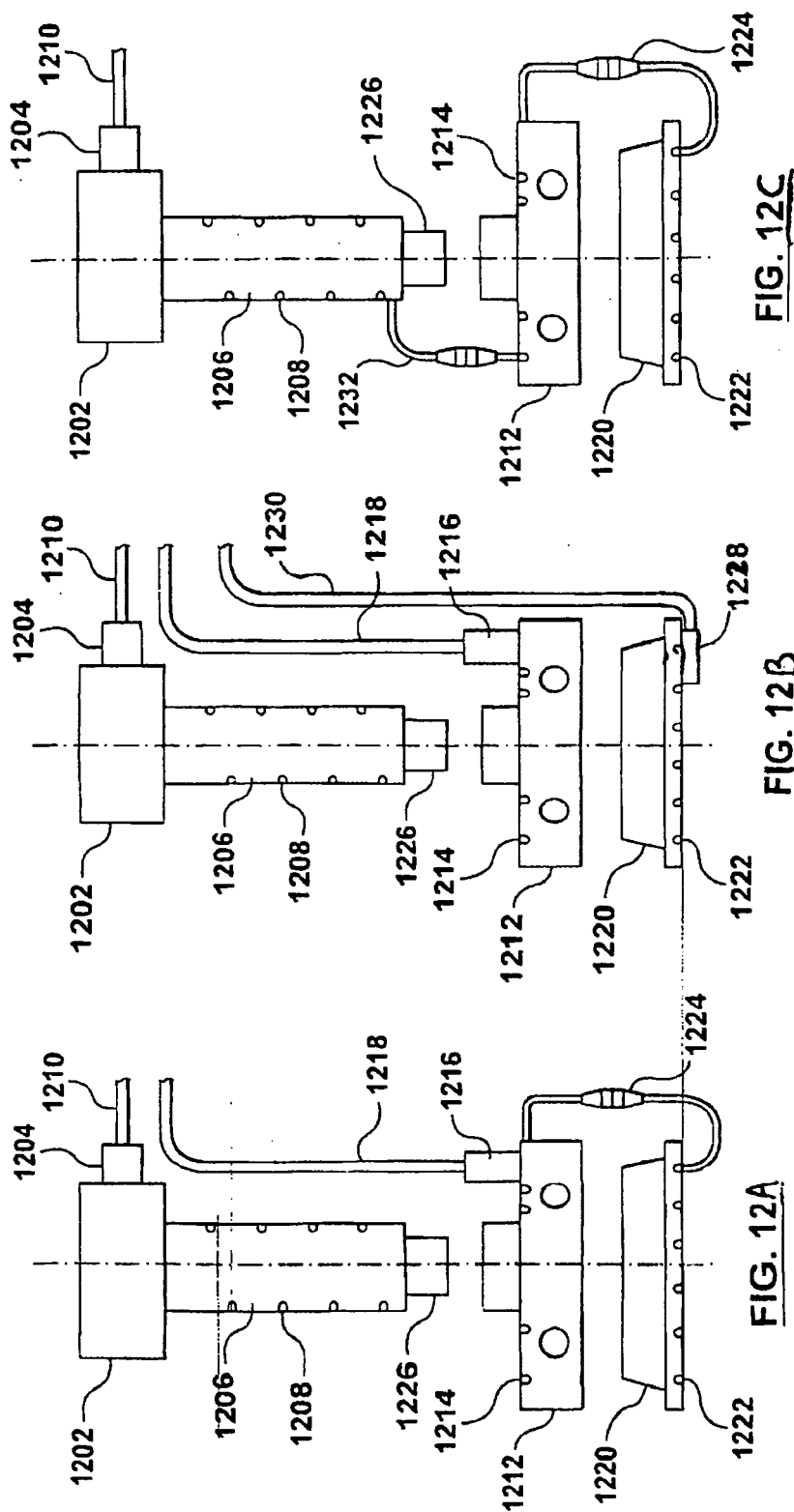


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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